L Number	Hits	Search Text	DB	Time stamp
1	31046	(light adj emitting) with device	USPAT; US-PGPUB	2004/05/27 13:03
2	18514	((light adj emitting) with device) and @ad<20000605	USPAT; US-PGPUB	2004/05/27 12:39
3	260	(((light adj emitting) with device) and @ad<20000605) and yamazaki	USPAT; US-PGPUB	2004/05/27 12:39
4	152	((((light adj emitting) with device) and @ad<20000605) and yamazaki) and electrode	USPAT; US-PGPUB	2004/05/27 12:58
5	76	(((((light adj emitting) with device) and @ad<20000605) and yamazaki) and electrode) and mask	USPAT; US-PGPUB	2004/05/27 12:40
6	76	(((((light adj emitting) with device) and @ad<20000605) and yamazaki) and electrode) not ((((((light adj emitting) with device) and @ad<20000605) and yamazaki) and electrode) and mask)	USPAT; US-PGPUB	2004/05/27 12:39
7	76	(((((light adj emitting) with device) and @ad<20000605) and yamazaki) and electrode) and mask	USPAT; US-PGPUB	2004/05/27 12:40
8	1475	(((light adj emitting) with device) and @ad<20000605) and electrode and mask	USPAT; US-PGPUB	2004/05/27 13:14
9	100	((((light adj emitting) with device) and @ad<20000605) and electrode and mask) and (second adj conductive)	USPAT; US-PGPUB	2004/05/27 12:58
10	33859	(light adj emitting) with device	EPO; JPO; DERWENT; IBM_TDB	2004/05/27 13:03
11	201	((light adj emitting) with device) and electrode and mask	EPO; JPO; DERWENT; IBM_TDB	2004/05/27 13:04
12	1375	((((light adj emitting) with device) and @ad<20000605) and electrode and mask) not (((((light adj emitting) with device) and @ad<20000605) and electrode and mask) and (second adj conductive))	USPAT; US-PGPUB	2004/05/27 13:15

US-PAT-NO: 6277679

DOCUMENT-IDENTIFIER: US 6277679 B1

TITLE: Method of manufacturing thin film transistor

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Abstract Text - ABTX (1):

The object of the present invention is to form a low-concentration impurity region with good accuracy in a top gate type TFT. Phosphorus is added to a semiconductor layer by using a pattern made of a conductive film as a **mask** to form an N-type impurity region in a self-alignment manner. A positive photoresist is applied to a substrate so as to cover the pattern and then is exposed to light applied to the back of the substrate and then is developed, whereby a photoresist 110 is formed. The pattern is etched by using the photoresist pattern as an etching **mask** to form a gate **electrode**. A channel forming region, a source region, a drain region, and low-concentration impurity regions, are formed in the semiconductor layer in a self-alignment manner by using the gate **electrode** as a doping **mask**.

Brief Summary Text - BSTX (5):

A thin film transistor (hereinafter referred to as a TFT) is utilized for the switching element of a pixel **electrode** of an active matrix type liquid crystal display device. As the demand for a high-definition liquid crystal display grows, the semiconductor layer of the TFT is required to be formed of polycrystalline silicon instead of amorphous silicon.

Brief Summary Text - BSTX (6):

If the semiconductor layer of a TFT is formed of polycrystalline silicon, it is possible to manufacture the TFT such that it has high mobility and a large on-current, and hence not only a pixel matrix circuit but also a driver circuit can be integrally formed on the same substrate. However, in the TFT using the polycrystalline silicon, a current leaking from a drain in an off state (that is, off current) is large, and hence, if it is used as the switching element of a matrix circuit, it can not hold the electric potential of the pixel **electrode**. Therefore, it has been a big problem to reduce the off current of the TFT.

Brief Summary Text - BSTX (8):

An underlayer film 11 made of a silicon oxide film is formed on a glass substrate 10. An amorphous silicon film is formed on the underlayer film 11 and is polycrystallized by applying an excimer laser thereto. The polycrystallized silicon film is patterned in a shape of island to form a semiconductor layer 12. A gate insulating film 13 made of silicon oxide is formed such that it covers the semiconductor layer 12. A metal film made of aluminum, tantalum, or the like is formed on the gate insulating film 13. A photoresist **mask** 14 is formed and the metal film is patterned in a predetermined shape by using the photoresist **mask** 14 to form a gate **electrode** 15 (see FIG. 9(A)).

Brief Summary Text - BSTX (9):

The photoresist **mask** 14 is removed and then impurities to be donors or acceptors are added to the semiconductor layer 12 by ion doping or by ion

implantation by using the gate **electrode** 15 as a doping **mask,** whereby impurity regions 16, 17 are formed in the semiconductor layer 12 in a self-alignment manner (see FIG. 9(B)).

Brief Summary Text - BSTX (10):

A photoresist **mask** 18 is formed which is wider in the direction of length of channel than the gate **electrode** 15. The length of a low-concentration impurity region is determined by the shape of the photoresist pattern 18 (see FIG. (C)).

Brief Summary Text - BSTX (11):

Impurities to be donors or acceptors are added to the semiconductor layer 12 by ion doping or by ion implantation by using the photoresist pattern 18 as a doping **mask,** whereby a source region 21, a drain region 22, and low-concentration impurity regions 24, 25 are formed in the semiconductor layer 12 (see FIG. 9(D)).

Brief Summary Text - BSTX (12):

The photoresist pattern 18 is removed and then the impurities added to the semiconductor layer 12 are activated by applying laser light to the substrate or by heating the substrate. An interlayer insulating film 27 comprising silicon oxide film is formed. Contact holes, that lead to the source region 21, the drain region 22, or the terminal part (not shown) of the gate **electrode** 15, are made in the interlayer insulating film 27. A metal film made of titanium or the like is formed and is patterned to form a source **electrode** 28, a drain **electrode** 29 and the lead wiring (not shown) of the gate **electrode** 15 (see FIG. 9(E)).